Valley Regional Fire Authority

Training Manual

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Reference: www.stihlusa.com

VRFA Task sheets: MS 460 Chainsaw Start Up Procedure (17-6.0); Power Tool Weekly Check and Operation (17-1.0.

STIHL "MAGNUM RESCUE" CHAINSAW

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Introduction

The Stihl MS 460 chainsaw was redesigned exclusively for fire, rescue and emergency service work with assistance from professional firefighters. The saw is lightweight and high powered even at mid-speed range, allowing it to be able to cut through such materials as composites, corrugated metals as well as numerous roofing materials. Additional features include:

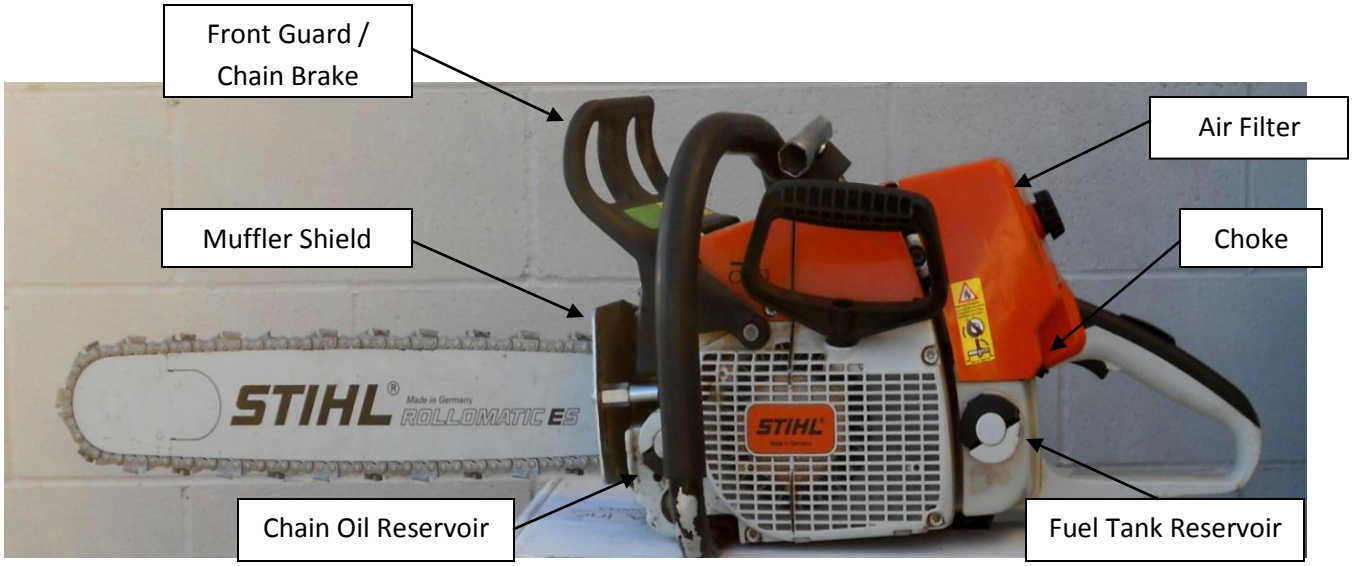
- Front hand guard to reduce risk of injury.
- Large starting handle to make it easier to grip and start the saw when wearing heavy protective gloves.
- Easily accessible air filter cover for quick removal of debris
- Stihl quickstop chain brake designed to stop chain in fraction of a second.
- Muffler shield which helps separate the hot muffler from meltable materials keeping it clean and operational.
- Built in tool holder keeps the bar wrench handy for quick chain adjustments.
- Extended chip deflector to help guide wood chips away from the operator.
- Automatic bar and chain oiler.

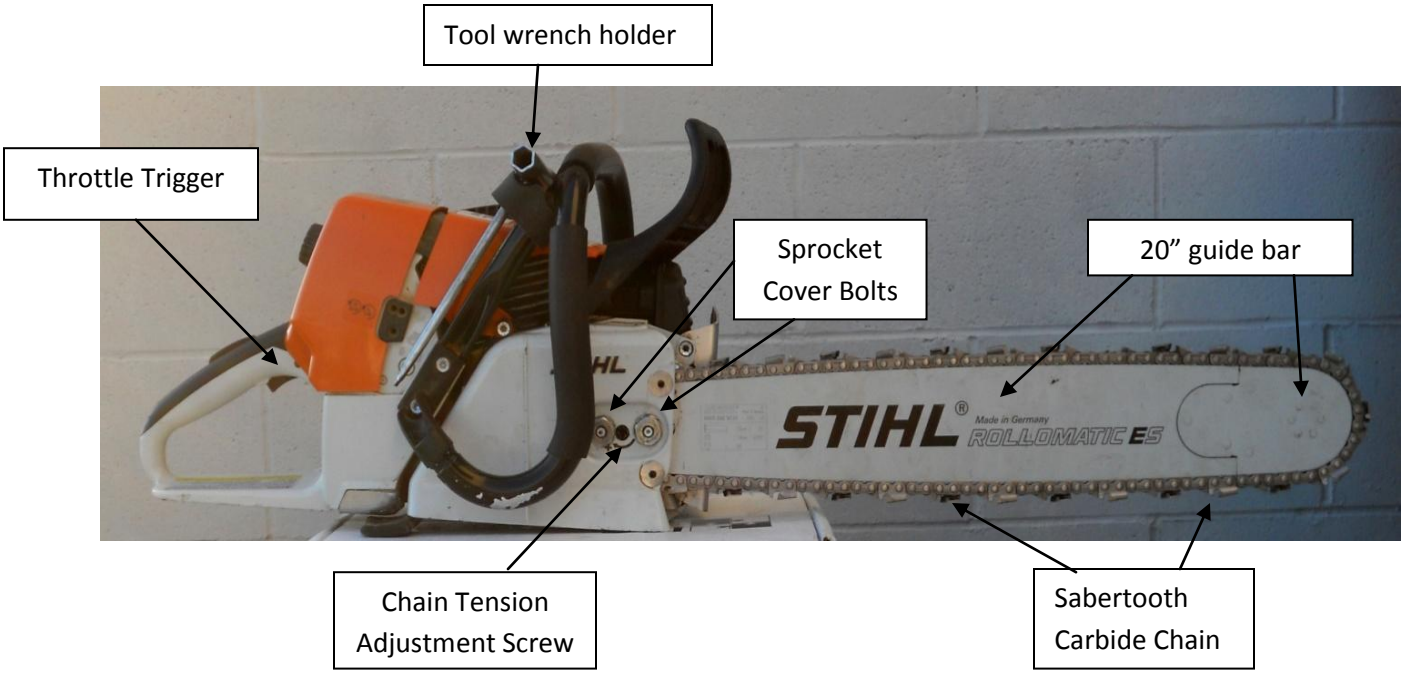
Currently all front line V.R.F.A. apparatus carry the Stihl MS 460 however replacement or reserve chainsaws vary in type and size. These other Stihl models include: 028, 036, and 038. If a replacement chainsaw is placed in service, it is recommend that firefighters review the owner's manual located on www.Stihlusa.com to become more familiar with their features.

I. Stihl MS 460 "Magnum Rescue" saw

MS 460

- 15.2 lbs.
- 76.5 cc. motor (two cycle)
- 20" guide bar
- 27.1 oz. fuel capacity (premix)
- 11.0 oz. chain oil capacity





Chain Brake

A chain brake is provided on chain saws to prevent injury to the operator and/or crew.

There are two ways that a chain brake is engaged: manual and automatic.

Members can manually engage a chain brake by pushing the hand guard forward with the left hand. This is a safety precaution the operator shall use when moving from place to place in the work area.

Automatic engagement most often occurs when the chain saw kicks back, causing the left hand to strike the hand guard. This occurs very quickly and the brake engages within 1/10 of a second.

Some chain saws are equipped with an inertia operated chain brake that engages whenever a violent movement of the chain saw occurs. This system is in addition to the standard chain brake.

To release the chain brake, grasp the hand guard and carrying handle with the left hand. Squeeze them together until the hand guard contacts the carrying handle. The chain brake is armed and ready for engagement.

NOTE: Never use the chain brake hand guard as a carrying handle.

CAUTION: DO NOT operate a chain saw at speeds above idle when the chain brake is engaged or engine damage may result.

II. **Operation**

The chain saw is an excellent tool when used for roof ventilation operations. Unlike other power tools, the chain saw can be used to "feel or read" rafters or joists.

Chain saws have excellent reach and balance, and can be used to safely perform various ventilation operations when operating on pitched roofs, from roof ladders, hips, peaks, valleys, etc.

The following tips will improve the safety and effectiveness of chain saw cutting operation:

A. Plan the Operation

- Make a decision on the cutting technique the ventilation team will use. This will depend on many variables including type of construction, extent and extension of fire, desired effect, etc. Avoid making excessively long cuts. Cuts of excessive length may invite members of the ventilation team to step within cut areas of the roof when attempting to remove cut sheathing. However, the length of cut will strongly depend on the ventilation technique being used. Dicing would require cuts no longer than a member can reach with an axe or chain saw.

- Plan the ventilation hole so that the ventilation team is always working toward a safe means of egress and/or away from the fire. Start the hole in an area as close to the fire as possible. If you have determined that a defensive hole is necessary, remember to trade "space for time". This will allow the hole to be completed before the fire travels to the work area. This is a prime consideration when strip ventilating.

- Pay particular attention to wind direction. Plan your ventilation hole so that: the smoke blows away from the operator and chain saw whenever possible. The chain saw operates best in a clear atmosphere. Heavy smoke could cause the chain saw to run poorly or even stall. Restarting the chain saw under smoke conditions may be impossible.

B. <u>Starting the Saw</u>

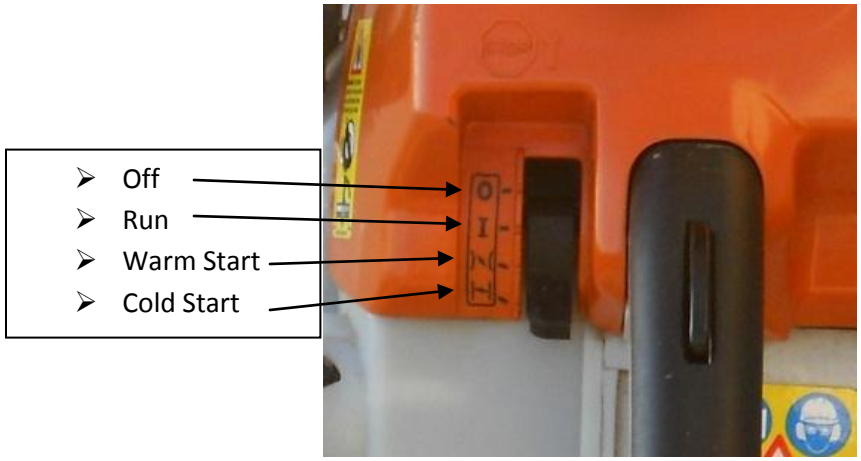
The chain saw should be prepared for use when removed from apparatus compartments as follows:

- Throttle trigger latched.
- Choke engaged.
- Compression release button "in" if chain saw is so equipped.
- Chain brake disengaged

Starting the chain saw is a one member operation:

1. Hold chain saw firmly on the roof, floor or ground with the chain clear of obstructions.

2. Set choke depending on operating conditions:



3. Pull starter cord JUST ENOUGH to engage starter pawls. Crank engine smartly with short pulls. Do not pull starter cord using long strokes as damage to cord may result. Maintain tension on cord as it rewinds. Do not let starter handle snap back to chain saw.

4. If the engine fires (“pops”) but does not continue to run, move choke lever upward one spot to “warm start”. When the engine runs, quickly squeeze and release the throttle trigger immediately to disengage choke. This places the saw in the “Run” position.

5. Warm the chain saw prior to cutting by bringing RPM's up to peak speed and then allowing them to drop off. Repeat this process several times. Set the chain brake when saw is left to idle.

CAUTION: Do not operate chain saws at continuous full RPM without a "load" on the chain.

6. Saws that have reached proper operating temperature and must be restarted do not require cold start choking. Place choke in warm start and restart saw.

CAUTION: Do not attempt to start chain saw with chain brake engaged. High revs with chain brake engaged will quickly damage the power head and chain drive.

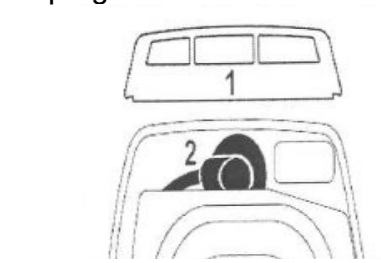
C. Trouble Shooting

If the chain saw will not start or if you did not move the choke lever to “Warm Start” quickly enough after the engine began to fire, the combustion chamber may be flooded. Attempt the following steps to correct the problem:

1. Remove the air filter cover.
2. Take out the baffle plate located at the top by lifting upwards.
3. Pull off the spark plug boot.

1. Baffle Plate

2. Spark plug boot



4. Unscrew and dry off the spark plug.
5. Set the choke to “Stop”
6. Crank the engine several times with the starter to clear the combustion chamber.
7. Replace spark plug, boot, baffle plate and air filter cover.
8. Set Choke to “Warm Start” (even if the engine is cold)
9. Attempt to restart the chain saw.

D. Extended operation

It may be necessary to use the chain saw for extended periods. During lengthy operations it may become necessary to refuel the chain saw, add chain lubricating oil, and adjust chain tension.

1. Fueling

Fuel hot chain saws with extreme caution. Gasoline spilled onto a hot exhaust pipe will cause the fuel to vaporize quickly, creating an extreme hazard. Clean all debris away from the fuel cap before opening.

NOTE: Use specified pre mixed fuel.

2. Chain Lubrication
Lack of lubrication will cause chain failure and unnecessary wear to the guide bar. Ensure bar oil is full and chain operates smoothes smoothly. Clean all debris away from the oil cap before opening.

3. Chain Tension
Extended operations will cause chain tension to loosen. See "Chain Tension Adjustment" below.

E. CHAIN

Carbide-tipped chains used by Valley Regional Fire Authority are resistive to dulling but subject to chipping. Cutting into materials other than wood or composition roof coverings should be avoided (steel hangers, conduit, plumbing, etc.).

If carbide tips become damaged, it will be necessary to replace the chain when:

1. Missing/damaged tips on 3 or more cutters in a row.

2. Missing /damaged tips on 6 or more cutters at random.

3. Dull chain

F. Chain Tension Adjustment

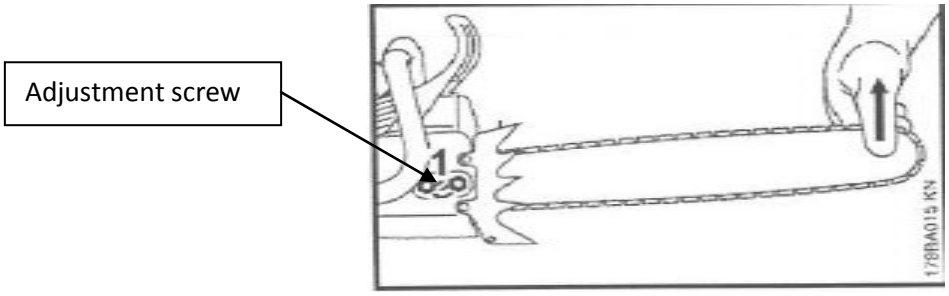
Proper chain tension is extremely important to the life of the guide bar and chain. Tension must be checked before and after use.

During extended cutting operations, check chain tension after every 15-20 minutes of cutting. Various conditions encountered during ventilation will affect chain tension. Roofs with heavy composition will heat chains much more rapidly than new roofs with light composition. These factors will help determine how often adjustment checks should be made. If the chain becomes excessively loose and jumps the drive sprocket serious damage to the saw and chain could result.

Proper chain tension adjustments are made in the following manner.

1. Loosen drive sprocket cover nuts.

2. Grasp tip of guide bar and raise to remove slack between guide bar and mounting studs.



3. Adjust tension screw, located along the front side of the sprocket cover of the chain saw. Turn clockwise to tighten. (Photo)

NOTE: Avoid injury by using gloves or wiping rag to protect hand when making adjustments or pulling chain through its travel.

4. While tightening adjusting screw, pull chain through its travel to locate any high spots. Make final tension adjustment to tightest place on chain.

Tension is correct when the chain travels freely around the bar as it is pulled by hand and the bottoms of all tie straps and cutters touch the underside of the bar rails.

5. Tighten drive sprocket cover nuts.

NOTE: Since heat is the primary factor causing the chain to loosen, the chain will contract when allowed to cool. Hot chains that have been adjusted during extended operations must be loosened to allow contraction as the chain saw cools. Failure to do this could cause excessive tension on the chain and drive sprocket resulting in serious damage to tine chain saw and/or chain.

III. **MAINTENANCE INSTRUCTIONS**

A. Daily Check

Daily maintenance of the chainsaws consists of checking the fuel and lubrication (bar) oil levels, choke in “Cold Start” position, compression button depressed, chain condition and proper direction of travel as well as a complete visual inspection to ensure its readiness.

B. Weekly Check

On Weekly maintenance, the chain saw should be removed from its compartment. Perform daily checks. The saw should be started and run for at least 10 minutes to ensure a smooth operation. Run up RPM by alternately depressing and releasing throttle.

CAUTION: Do not run chain saw at full RPM without load for more than a few seconds or engine damage may result.

Check to see if chain is oiling properly. At idle speed, engage chain brake. Shut off chain saw and allow it to cool. Check chain tension and readjust if necessary. Inspect starter cord for fraying and contamination. Top off fuel and chain lubricating oil levels if necessary.

NOTE: Fill out a maintenance request for any necessary repairs.

C. CLEANING

The chain saw shall be thoroughly cleaned after each use. The best method for cleaning is the use of an air compressor. Be sure to wear eye protection while cleaning.

Some chain saws will require more extensive disassembly than others. It is extremely important that the drive sprocket cover is removed and the area cleaned of all sawdust and debris. This process helps prevent overheating and/or poor cutting performance.

1. Remove the chain sprocket cover on the right side of the saw by unscrewing the two large hexagon nuts counterclockwise.

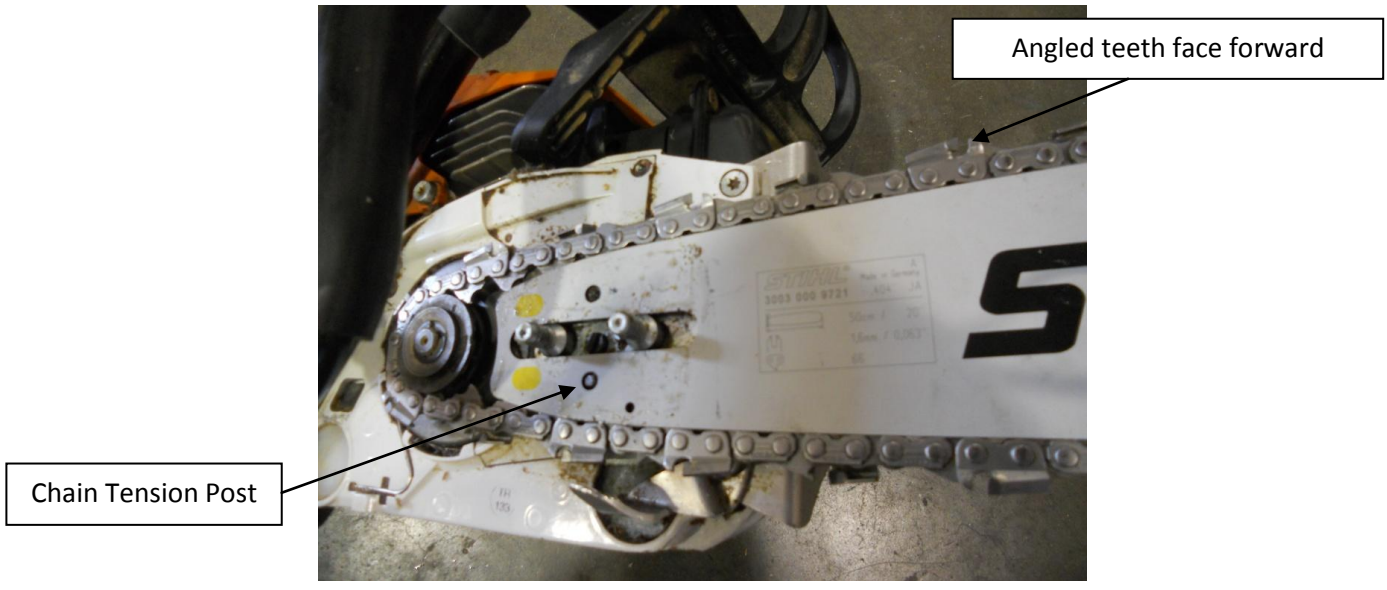
2. Remove guide bar and chain from sprocket. Remove chain from guide bar.

3. Inspect the condition of the chain for:
    a. 3 damaged carbide teeth in a row
    b. 6 damaged carbide teeth (total)
    c. Replace chain if damage is noted or chain was used excessively ("dulled")

4. Clean the guide bar (Use solvent to remove stubborn materials). Inspect the groove of the bar and clean out, if necessary. (i.e. putty knife, ladder scraper, etc.).

5. Clean sprocket area and cover.

6. Once clean replace chain on guide bar and install on sprocket.
    a. Ensure chain is facing forward (angled teeth should face forward)
    b. Make sure the chain tension post is aligned and seated properly with guide bar. You may need to reduce chain tension to complete this.



7. Replace sprocket cover. Only hand tighten hexagon cover nuts until chain tension is adjusted.

8. Remove and inspect air filter. For light debris, air filter can be cleaned by using the air compressor. For stubborn debris or sticky filter, clean the air filter using warm soap and water. Allow to air dry.

9. Reinstall the air filter once clean.

10. Once assembled, check chain tension. Adjust chain to desired tension. See Page 8.

11. Ensure there is no chain sag on the underside of the bar and the chain pulls through smoothly. Make sure the drive links are properly located in the guide bar groove.

12. Once adjusted, tighten down the two large hexagon nuts firmly.

13. Pull the chain through several times to make sure it glides smoothly.

14. Start saw and run until thoroughly warm.

CAUTION: Do not operate saw at full rpm continuously with no load or engine damages may result.

15. Allow chain saw to cool and check chain tension once again. Add fuel mix and chain lubricating oil as needed.

16. Replace saw on apparatus with switches in proper position.

IV. **Safety Considerations**

A. Safety Equipment:

The following safety equipment shall be used in conjunction with chain saw operations at all times:

1. Gloves
2. Goggles
3. Helmet
4. Bunker gear
5. Ear protection
6. Chaps (when available)

Although equipped with a centrifugal clutch, the chain of a chain saw at idle speed may continue to spin. Therefore, turning with a running chain saw in hand must be done with extreme caution.

When cutting, the operator should strive to be positioned to keep the chain out of line with the body. The proper positioning of the chain saw and body could prevent injury from a broken chain, flying debris, or chain saw kickback.

Chains are capable of dislodging and throwing objects such as nails, small rocks and splinters for a considerable distance. Eye protection shall be worn by all members involved in cutting operations.

B. Safety Person

Cutting is an operation involving a minimum of two members: the operator and safety person. The primary responsibility of the safety person is to:

1. Alert the operator of changing or unsafe conditions
2. Prevent injury.
3. Assist the operator who is backing up while involved in cutting operations.

Since a running chain saw creates a serious communication problem, the safety member will have to use gestures or "body language" to communicate effectively. The safety member must maintain contact with the operator at all times. An effective way for the safety member to remain in contact with the operator is to use an UNDERHANDED grip on an axe scabbard belt, B/A frame/webbing, etc.

Safety person must be prepared to keep the saw operator from falling over objects or into the hole being cut.

C. Position the Saw

An advantage of the chain saw is the operator's ability to "feel" the work. This "feel" is critical in order to avoid damaging structural members beneath the surface of the decking. When used to locate structural members, the chain saw should be held in an upright position, perpendicular to the roof's surface. A perpendicular chain saw causes an increased number of chain teeth to contact structural members, causing more resistance to the operator/saw, thereby improving the feel.

Once the structural members (rafters, joists, etc.) have been located, the chain saw may be lowered to approximately 45º to the cutting surface for continued cutting. If additional structural members are encountered the chain saw can be utilized to "roll" over the structural members.

D. "Rolling" Structural Members

When a structural member is encountered, the operator should lift the chain saw nearly out of the work and continue over the top of the structural member before returning to the same depth of cut.

E. Depth of Cut

Safe depth of cut is a cut deep enough to accomplish intended ventilation operations without destroying tire structural integrity of the roof.

Excessively deep cuts may destroy structural integrity, endangering the ventilation team and may expose the operator to electrical hazards. Striking other materials found below the surface of the roof decking may cause chain damage, rendering the saw less effective or inoperable.

Safe depth of cut will depend on four factors:

1. Type of construction
2. Thickness of roof covering
3. Thickness of decking
4. Intended operations

As an example, some ventilation methods on a panelized roof will require a deep cut to saw through 2" x 4" joists. This is a safe cut as determined by type of construction and intended operation. A safe cut on a trussed joist roof would be much shallower when considering all of the above factors.